

with astonishment, that Huxley's observations upon *Pyrosoma* were "conducted upon thin sections (that is to say, cut by hand with a razor, and not with a pair of scissors) of a spirit specimen, rendered clear by glycerine."

When all this is borne in mind, we can but admire the accuracy of the observations, taken as a whole, which Huxley was able to make upon the anatomy and development of this remarkable form of life; while any impulse we may feel to criticise an error with regard to finer points of cytological detail will be checked by the thought that if, in the short space of forty years, biology can make such progress in the investigation of the most mysterious of vital processes, what judgments may the future not have in store for much of our work at the present day, even within the lifetime of many of us!

We have said enough, we hope, to prove how much interesting reading of the most varied kind is furnished by the collected works of one of our greatest scientific men, and we feel sure that many will look forward with pleasurable anticipation to the continuance and completion of this series.

E. A. M.

#### SCENERY AND GEOLOGY.

*The Scientific Study of Scenery.* By John E. Marr, M.A., F.R.S. Pp. xi + 368. (London: Methuen and Co., 1900.)

SO much has been done within the last thirty years in all parts of the world, and especially in America, to discover and interpret the varied forms of earth-sculpture, that the knowledge required to be summarised. Scientific surveys and explorations, the facilities for travel, and the use of the camera have largely contributed towards the accumulation of facts. One result, and by no means the most satisfactory one, is the increase of technical terms, for which our American brethren are largely responsible. To remember what is the Uinta type of mountain folding; what is meant by consequent, subsequent and obsequent streams, by inconsequent drainage and corrasion; and what is the difference between clouds of radiation, of inversion, of interfret, and of inclination, may tax the memory and patience of any one who is not constantly engaged in teaching. Here Mr. Marr comes to the rescue, describing and explaining in clear language all the leading types of scenery, and many of the minor and no less interesting features connected with it. He discusses the origin of hill and dale, of peneplain and nunatak, butte and zeuge; and, moreover, he gives in his work an index which will enable us to dispel our ignorance or refresh our memories when, as so often happens, we come across an unfamiliar or forgotten term. There was need for this concise handbook on the scientific study of scenery.

The author makes a praiseworthy attempt to please two classes of readers—the student and the "general reader." That his work will be appreciated by the student we are fully persuaded. That the general reader will steadily pursue the volume must depend upon whether he or she reads for the sake of solid instruction.

The author's brief introduction is fascinating, but we are plunged in the next chapter into "three envelopes," the lithosphere, hydrosphere and atmosphere, and into a consideration of anticlines, synclines and monoclines, and planes of foliation, cleavage and faulting: subjects necessary for the proper understanding of various types of scenery, but not readily dealt with in pleasing language. Here and there throughout his book the author enters into a little more detail than appears to be required to explain the relation between rock-structure and rock-texture and scenery; and the general reader may find it difficult to distinguish between the "Normal Fault" and the "Monoclinical Fault" figured on p. 66. When, however, the author speaks of his work as an "Introductory Treatise on Geomorphology," we feel not only that he intends it mainly for serious study, but that he has a very decided personal regard for technical terms. He shows how dependent the scenery is on the structure of the earth's crust, on the sculpturing agents, and on the character of the climate. The colours of the sky, the water and the rocks, the forms of cloud, and the influence of vegetation come in for appropriate notice in different parts of the volume.

Continents and ocean-basins, crust-waves and speculations on lines of uplift are duly considered, and so also are mountains and valleys, escarpments, volcanoes, deserts and plains, oceans and oceanic islands. The author writes with evident enthusiasm for his subject; and whenever he is free from detail, the labours of the conscientious reviewer become more pleasant. With Kingsley he can speak with eloquence of the beauties of the Fenland, and with Captain McMahon of the charms of the desert. He records his sorrow at "the mutilation of a district rich in natural beauty" by the operations of mining or quarrying, when such works are not, as was the case with the water-works of Thirlmere, "justifiable on the ground of necessity." We remember to have seen quarrying operations in the heart of the Cheddar Cliffs, perhaps the finest inland cliffs in England, and this is an instance where local rights should be compulsorily purchased at the public expense.

We are glad to find the author dealing, every now and again, with the sentimental aspects of the subject. Hugh Miller, jun., enlarged on such topics in his "Landscape Geology" (1891); while the more recreative aspects of scenery are charmingly portrayed in the Badminton volume on Mountaineering, by Mr. C. T. Dent.

The work before us is illustrated by an admirable series of plates, reproduced from photographs. The High Force of Teesdale and the Screes of Wastwater are fine examples; while others, equally good, exhibit mountain structure, glaciers and lakes. The origin of lakes is varied, but the subject has given rise to much controversy among geologists—a controversy mainly concentrated on the question whether rock-basins of any magnitude have been excavated by ice-action. On this subject Mr. Marr has his doubts, and he says

"that in order to prove that ice can excavate a basin, we must show, first, that the actual rock basin exists; and, secondly, that it cannot have been formed in any other way than by the erosive action of ice."

The question is one which is under investigation at the present time; but it may be observed that, in many a lake,

earth-movements, dams and erosion may all have contributed towards the production of the features.

The work of frost, snow and ice, and the accounts of glacial phenomena past and present, are, like every other portion of his subject, very fully and ably dealt with by the author. The work, indeed, embodies the results of the most recent researches on all the physical features of the earth's surface; it unites the labours of the geographer and geologist; and should prove a most helpful companion to every traveller. H. B. W.

### OUR BOOK SHELF.

*Plant Relations: a First Book of Botany.* By John Coulter, A.M., Ph.D. Pp. vii + 264. (New York: D. Appleton and Co., 1899.)

A NOTABLE tendency to be observed in many modern text-books of botany is one indicating a departure in the direction of "natural history" as distinct from the more formal, and especially the histological, methods of teaching which have been in vogue (and somewhat too exclusively so) during the last few decades. It is perhaps chiefly in American works that this change has been most prominent, and Prof. Coulter's new book forms a weighty addition to the list.

It may perhaps be open to question whether ecology, as it is now the fashion to designate what used to be called natural history, is precisely the best aspect from which to treat botany regarded as an instrument of school education. For it is impossible to escape from a certain elusive vagueness in attempting even an elementary discussion as to the nature and interaction of the factors which determine so complex a matter as the forms or the mutual adaptation of living organisms.

But whatever may be thought in the abstract, of ecology as an introduction to botany from the scholastic point of view, there can hardly be two opinions with regard to the fascinating nature of the study itself; and as Prof. Coulter remarks in the preface to his book, it may perhaps not unfairly be argued after all that "the study of the most evident life-relations of plants gives a proper conception of the place of plants in nature. . . . The large problems of ecology are constantly presented in subsequent experience, when details of structure would be forgotten." The latter sentence, however, involves an admission of principles to which many educationalists would refuse assent. Prof. Coulter's book contains a great deal more, however, than geology in the more limited sense of the term; and it may perhaps not unfairly be described as dealing with the plant primarily as a living organism, a "going concern," and one which has, moreover, to maintain the order of its going.

In fact, the author may be congratulated on having produced one of the most interesting and refreshing little text-books that have appeared in recent years, and it will well repay a perusal on the part of those whose business it is to teach as well as to learn. The dominant note all through the book is physiology, using the term in its widest sense; and, although here and there perhaps an expression might prove to be open to misconstruction, the treatment is generally accurate and lucid. The differences between spores and seeds, for example, are (p. 111) forcibly and almost epigrammatically expressed, and this is but one out of many instances which might have been cited.

The numerous illustrations, which are nearly all excellent, add materially to the value of the book, and those which portray the vegetation characteristic of the different physical conditions of life call for especial praise. Not only are they admirably reproduced, but they really do emphasise clearly the *facies* of the various kinds of plant-societies. J. B. FARMER.

*Elementary Chemistry for High Schools and Academies.* By Albert L. Arey, C.E. Pp. xi + 271. (New York: The Macmillan Company, 1899.)

MR. AREY has followed the syllabus of the New York State Board of Regents in selecting portions of the science of chemistry for treatment, and in deciding the order in which such subjects shall be dealt with. A notable characteristic of his book is the admirable series of questions which the author has interspersed with the view of guiding the student's inferences, and of suggesting a definite line of thought in each experiment. But the exigencies of teaching in schools where the syllabus of instruction is laid down by an outside authority has made it impossible for Mr. Arey to consistently follow out this excellent plan; for the students are expected to become familiar with substances which do not lend themselves to experimental treatment, and with principles which cannot be practically proved, at the hands of young pupils. The consequence is that two methods of presentation exist side by side. In one the student is told the properties of certain chemical bodies; while in the other the properties of the compounds have to be determined by the pupil's own observation, and are not stated in the book at all. Notwithstanding this, the volume provides a good introduction to the study of inorganic chemistry.

*A Manual of Chemistry, Inorganic and Organic.* By Dr. Arthur P. Luff, B.Sc., and Frederic J. M. Page, B.Sc. Pp. xvi + 541. (London: Cassell and Company, 1900.)

DR. LUFF'S "Introduction to the Study of Chemistry," which has been well known to medical students for the past eight years, has been completely revised by Mr. Page, who has also incorporated such new facts and methods as the research work of these years has made necessary. The plan of the book is of a kind which was more familiar twenty years ago. No instructions for experiments to be performed by the student himself are included, except in the short concluding section of the volume, which provides tables for the examination of chemical substances containing one metal and one acid, and includes some half-dozen pages on the preparation of a few typical compounds. The book will probably continue to be useful in assisting medical students to pass their examinations; but it is unlikely to be adopted for any other purpose. So much ground is covered in the little volume that in parts it is little more than a dictionary.

*Dictionary of the Lepcha Language.* Compiled by the late General G. B. Mainwaring. Revised and completed by Albert Grünwedel. Pp. xvi + 552. (Printed and published by order of H.M. Secretary of State for India, 1898.)

THE preservation of the language of a dying race is a duty which ought never to be neglected. The late General Mainwaring had an intimate acquaintance with the language of the Lepchas of the Sikkim and Darjiling hills, and published a grammar of it in 1876. He also collected the materials for a dictionary, but death prevented him from completing it. To Dr. Grünwedel was entrusted the task of preparing this work for press, and he has found it a very difficult one. The whole of the manuscripts had to be rewritten and rearranged, and many new definitions had to be added. Errors and discrepancies are inseparable from a dictionary of an Indian language commenced by an Englishman, completed by a German, and printed by printers who understand neither Lepcha nor English; but they will be overlooked if the difficulties the editor has had to contend with, and the permanent value of the work, are considered.